



# New sensor technologies counter chemical threat

As global terrorism moves the threat of nuclear, biological and chemical warfare to towns and cities, Norman Davis Jr, CEO of Microsensor Systems, Inc, talks to *Defence Systems International* about how detection technologies are being adapted to the urban environment.

Never has the fear of nuclear, biological or chemical (NBC) attack been so palpable on the streets of cities, and civilians are increasingly aware that they – not necessarily the military – are targets. No surprise then that civilian authorities and first response agencies are looking to equip themselves with the latest in detection technology.

'NBC attack used to be a passing concern,' says Norman Davis of Microsensor Systems, Inc (MSI). 'People thought we were crazy to develop detectors for non-military use, but after the 1995 Tokyo subway attack we have seen a great deal of interest from state and local civilian organisations, particularly in the USA.'

Developing detection systems for the civilian environment requires new approaches, as civilian first responders have different needs. 'Much of the equipment on the market has not taken the needs of the civilian sector into account,' says Dr Hank Wohltjen, chairman and chief technical officer at MSI. 'We saw the emergence of the civilian market in the 1990s and have been developing the technology since then.'

## Civilian needs

First, this technology needs to be easy to use without extensive training. While the military often train with detection equipment, civilians do not. Civilian first responders need chemical detectors that are capable of detecting a broad spectrum of threats, ranging from conventional nerve and blister agents to toxic industrial chemicals. Above all the detectors must be reliable. After sitting on the shelf unused for months or years, detectors must be operational in a few minutes. Furthermore, they must not use radioactive materials or non-standard batteries that are hard to source.

Perhaps most importantly, unlike military users, civilian users have a much lower tolerance for false-positive alarms, as these can result in the evacuation of large numbers of people who are not trained or equipped to use protective gear. Finally, civilian first responders need detectors that are affordable to own and use. Meeting these needs is the goal of MSI's development of a new generation of solid-state, microsensor-based, chemical detectors.

## Surface acoustic wave microsensors

MSI's innovations include a new approach to chemical agent detection using surface acoustic wave (SAW) microsensor

devices. First invented in 1978, SAW microsensors are very small, rugged, solid-state devices that produce an RF signal that is extremely sensitive to small mass changes on the device surface. A sensitive vapour detector can be made when the sensitive surface is coated with a polymer film that acts as a 'sponge' for a particular vapour.

An array of different polymer-coated SAW sensors creates a highly effective chemical threat detector when combined with a selective vapour sampling system and a computerised pattern recognition algorithm. While such systems once required large, cumbersome, power-hungry and expensive RF circuitry, the wireless mobile revolution has produced many low-cost, low-power, high-performance RF devices that have radically improved the capabilities of SAW-based chemical detection systems.

'SAW technology is the most exciting part of our development right now,' says Davis. 'We're the new kids on the block with this technology, but it allows us to build smaller, less expensive sensors that can warn users of a much broader range of threats. The civilian market can now get sensors of the standard they require.'

Next-generation chemical detection systems, such as Hazmatcad™ and CW Sentry Plus, are enjoying considerable success because of their reliability, affordability and minimal maintenance requirements. Combining a selective sampling system with a multi-sensor SAW array and a pattern recognition algorithm, provides an architecture that delivers superior false-alarm rejection characteristics. 'Limiting false alarms is a focus of our research, along with lower power usage,' says Davis. 'The development process is relentless, and we see no end to it, as the civilian market is just starting to open up.'

As SAW technology continues to improve, MSI believes that there is a long way to go before its new sensors come anywhere near their fundamental performance limits. 'Our goal,' asserts Davis, 'is to develop the response technology faster than the potential threats can accumulate.' \*

## Further information

Microsensor Systems, Inc  
Tel: +1 270 745 0099 Fax: +1 270 745 0095  
Email: sales@microsensorysystems.com  
Website: www.microsensorysystems.com